IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:
FLUX DRIVE, INC.

Serial No.: 10/790,571

Group Art Unit: 2834

Filed: March 1, 2004

Examiner: Dang D. Le

Title:
APPARATUS TO TRANSFER
TORQUE MAGNETICALLY

Date: Monday, June 5, 2006
US Express Mail Air Bill
~~ED 756122300 US~~
EQ 314749137 US

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DOCUMENT AUTHENTICITY DECLARATION UNDER 37 CFR 1.132 OF STEVEN J. MILLER, ESQ.

BE IT ACKNOWLEDGED, that Steven J. Miller, the undersigned declarant, being of legal age, does hereby declare and certify as follows:

1. I have personal knowledge of the facts stated herein and I am competent to testify to these matters.
2. I am counsel to the Applicant in the above captioned patent application.
3. I hereby certify that attached hereto is Applicant's "Exhibit A" consisting of a true copy of the Japanese Patent Number JP 02-74146 mailed to the undersigned, by the US Patent Office along with the Final Office Action mailed on April 4, 2006, followed by the Certified Translation of said Japanese Patent Number JP 02-74146 (Masaki), received by the undersigned from Park Evaluations and Translations, located at 850 7th Avenue, Suite 501, New York, NY 10019.

4. Pursuant to 28 USC 1746, I declare under penalty of perjury that the forgoing is true and correct, except as to statements made upon information and belief, and as to those I believe them to be true.

Executed this 5th day of June 2006.

Steven J. Miller, Esq.

PATENT ABSTRACTS OF JAPAN

(11)Publication number : 02-074146

(43)Date of publication of application : 14.03.1990

(51)Int.Cl. H02K 49/02

(21)Application number : 63-223314

(22)Date of filing : 06.09.1988

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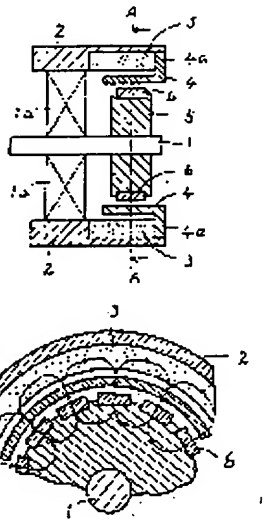
(54) ATTENUATOR OF TURNING EFFORT OF ROTOR

(57)Abstract:

PURPOSE: To obtain stable damping force against rotation and to reduce maintenance manpower by arranging a conductor movable relatively to a magnet between the magnet and a magnetic body.

CONSTITUTION: A rotary shaft 1 is born by a housing 2 through a bearing 1a where a magnetic ring body 3 is secured to the inside of the housing 2 and a conductor 4 having a flange section 4a is arranged to shield the magnetic body 3. A cylindrical or tubular body 5 is secured to the rotary shaft 1 such that it can move relatively to the magnetic body 3, while facing therewith, through the conductor 4 and even number of magnets 6 are arranged at the outside thereof such that N pole and S pole appear alternately. In other words, magnets 6 having alternating polarity produce magnetic lines of flux which causes production of eddy current in the conductor 4. The eddy current produced through rotation of the magnets 6 around the rotary shaft 1 functions to retard the rotation thus producing damping force proportional to the rotational speed of the magnets 6.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's decision of rejection]

[Date of extinction of right]

⑲日本国特許庁(JP)　⑪特許出願公開

⑫公開特許公報(A)　平2-74146

⑤1Int.Cl.⁵	識別記号	庁内整理番号	⑬公開　平成2年(1990)3月14日
H 02 K 49/02	B	7740-5H	

審査請求　未請求　請求項の数 2　(全3頁)

⑤4発明の名称　回転体の回転力減衰装置

⑳特　願　昭63-223314
㉒出　願　昭63(1988)9月6日

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明　細　書

1. 発明の名称

回転体の回転力減衰装置

2. 特許請求の範囲

(1) 径大な円筒状の外筐と、この外筐に同軸的に軸支され、相対的に回転するよう構成された径小の円柱又は円筒体とからなる回転体の回転力減衰装置において、前記外筐の内側にリング状の磁性体を形成するとともに、前記円柱又は円筒体の外周に外側に向かってN極とS極が交互に現れるように磁石を配置し、この磁石と前記磁性体との間に磁石とは相対的に移動する導電体を備えたことを特徴とする回転体の回転力減衰装置。

(2) 径大な円筒状の外筐と、この外筐に同軸的に軸支され、相対的に回転するよう構成された径小の円柱又は円筒体とからなる回転体の回転力減衰装置において、前記円柱又は円筒体の外側を磁性体で構成するとともに、前記外筐の内周に内側に向かってN極とS極が交互に現れるように磁石を配置し、この磁石と前記径大の円筒との間に磁石とは相対的に移動する導電体を備えたことを特徴とする回転体の回転力減衰装置。

3. 発明の詳細な説明

[発明の目的]

(産業上の利用分野)

この発明は、回転機構の回転力減衰装置の改良に関する。

(従来の技術)

従来の回転機構の回転力減衰装置には、いわゆるブレーキと称するもので種々あるが、機械的摩擦力を利用する方法や粘性を利用してブレーキを働かす方法などがある。

前者は、機械的摩擦力を利用しているので、ブレーキ機構の摩耗による寿命があり、装置の保守、交換が必要とされ、また摩耗により粉塵が発生し、回転接触片等への付着等、悪影響を与える恐れがあった。

一方、粘性によるブレーキは、回転力を粘性で吸収する点で摩擦力によるものと相違するが、構造上粘性流体をどのようにして密封(シーリング)

するかが問題であり、また周囲等の温度変化に伴う粘性特性の変化があるなど機能維持の上で安定性に欠けるという欠点があった。

（発明が解決しようとする課題）

以上のように、従来の回転機構の回転力減衰装置は、長期使用上及び構成上の点で種々問題があった。

この発明は、摩擦力にもよらず、また粘性流体をも使用することなく、磁石力の利用で減衰力を得ることにより、上記従来の欠点を解消することを目的としたものである。

［発明の構成］

（課題を解決するための手段）

第１の発明は、径大な円筒状の外筐と、この外筐に同軸的に軸支され、相対的に回転するよう構成された径小の円柱又は円筒体とからなる回転体の回転力減衰装置において、前記外筐の内側にリング状の磁性体を形成するとともに、前記円柱又は円筒体の外周に外側に向かってＮ極とＳ極が交互に現れるように磁石を配置し、この磁石と前記磁性体との間に磁石とは相対的に移動する導電体を備えたことを特徴とする。

第２の発明は、径大な円筒状の外筐と、この外筐に同軸的に軸支され、相対的に回転するよう構成された径小の円柱又は円筒体とからなる回転体の回転力減衰装置において、前記円柱又は円筒体の外側を磁性体で構成するとともに、前記外筐の内周に内側に向かってＮ極とＳ極が交互に現れるように磁石を配置し、この磁石と前記径大の円筒との間に磁石とは相対的に移動する導電体を備えたことを特徴とする。

（作　用）

上述のように、上記第１の発明も第２の発明も、いずれも相対的に回転する外筐及び回転円柱又は円筒体との組合わせからなる回転機構の減衰装置において、相対的に移動する回転体間をいずれか一方に設けた磁石の回転移動により、導電体に発生した渦電流が回転運動を妨げる方向に力が働くことを利用して回転力を減衰させたものである。

（実施例）

以下、この発明による回転体の回転力減衰装置の実施例を第１図ないし第４図を参照し詳細に説明する。

第１図はこの発明装置の第１の実施例を示す縦断面図で、モータ等に連なる回転軸1 は外筐2 とは軸受け1aを介して回転自在に軸支されている。

外筐2 の内側には、リング状に鉄等の磁性体3 が固定して取着されるとともに、この磁性体3 を遮るように同じく鍔部4aを設けた導電体4 が外筐2 に固定されている。

前記導電体4 を介して前記磁性体3 に対向して相対的に回転移動するように、前記回転軸1 に円柱体又は円筒体5 が固定され、その外側には第２図に示すように回転方向に順次Ｎ極とＳ極が交互に現れるように偶数個の磁石6 が配置される。

以上の構成からなるこの発明装置の回転力減衰動作を第３図を参照し説明する。第３図は第１図のＡ－Ａ線で切断し矢印方向を見た一部切欠き横断面図である。なお、第３図には第１図と同一構成には同一符号を付し、詳細な説明を省略する。

即ち、交互に磁極方向を異にした磁石6 により磁力線は矢印にて示した方向に発生しているが、導電体4 には磁石6 により渦電流が発生する。

従って、磁石6 が回転軸1 を中心として回転することによって、発生した渦電流はその回転を妨げる方向に力が働くので、磁石6 の回転速度に比例した減衰力が作用する。

第１図ないし第３図において、磁石6 は円筒体5 に設けられ、回転軸1 とともに回転するものとして説明したが、導電体4 と磁石6 とは相対的に回転していれば同じ作用が得られるから、磁石側を固定し、外筐側を回転するように構成してもよい。

この発明装置では、前記第１図の構成で、外筐側の構成を回転側に、また、回転側の構成を外筐側に転換しても全く同様に実現できる。

即ち、第４図にこの発明の第２の実施例を示した断面図であるが、回転円筒体5 の外側にリング状に磁性体3 を構成するとともに、前記外筐2 の内周に内側に向かってＮ極とＳ極が交互に現れる

ように磁石6を配置し、この磁石6と円筒状の間に導電体4を回転軸1側に設けたものである。

この結果、第1図と同様に、磁石6により導電体4に生起される渦電流は、導電体4の回転移動とともに、これを妨げる方向に力が作用するので、回転軸1の回転力は減衰される。また、この実施例においても、導電体4側を固定させ、磁石6側を回転させても同様な効果が得られる。

以上のように、この発明による回転体の回転力減衰装置は、従来のように、機械的摩擦力や粘性を利用しないので、機械的摩耗や粘性の劣化等を考慮することもなく、また簡単な構成からなるので、信頼性の高い装置を実現できる。

［発明の効果］

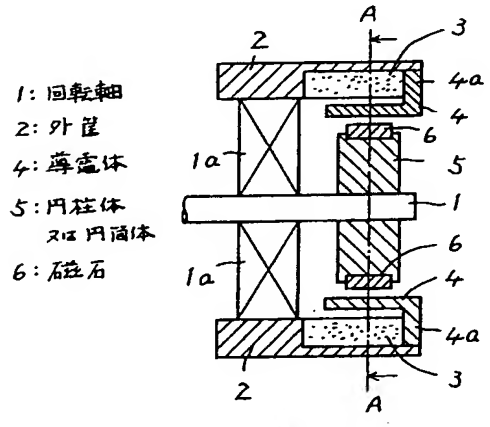
この発明装置は、回転軸上に磁石及びその磁力線を通す磁性体と、渦電流を発生させる導電体の組合わせという簡単な構成で、何等機械的摩擦力を利用することなく安定した回転減衰力を得るものであり、保守点検など維持管理の労力軽減が図れる等実用上の効果大である。

4. 図面の簡単な説明

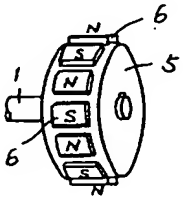
第1図はこの発明による回転体の回転力減衰装置の第1の実施例を示す縦断面図、第2図は第1図に示す装置の回転体を取出して示した斜視図、第3図は第1図においてA-A線から切断し矢印方向を見た一部切欠け横断面図、第4図はこの発明装置の第2の実施例を示す縦断面図である。

1 …回転軸
2 …外筐
4 …導電体
5 …円柱体又は円筒体
6 …磁石

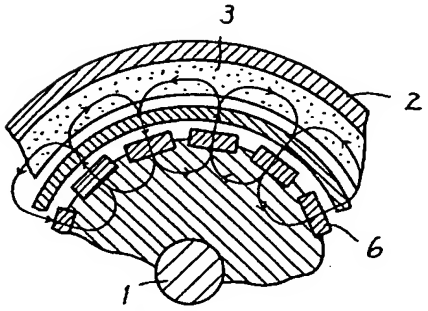
代理人　弁理士　大　胡　典　夫



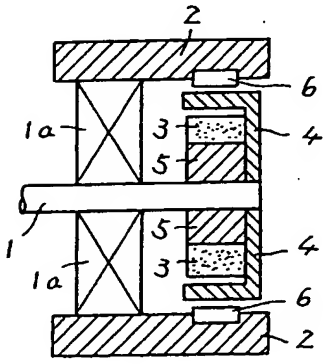
第　1　図



第　2　図



第　3　図



第　4　図

Park Evaluations & Translations

Certification

Park Evaluations & Translations

TRANSLATOR'S DECLARATION: April 11, 2006

I, Todd Adkisson, hereby declare:

That I possess advanced knowledge of the Japanese and English languages and that the attached translations are accurate and reflect the meaning and intention of the original texts.

Todd Adkisson

Todd Adkisson

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(19) Japanese Patent Office

(12) Publication of Patent (A)

(11) **Patent No.: H2-74146**

(43) Disclosure Bulletin Date: March 14, 1990

(51) Int. Cl.	Identification Symbol	JPO Processing Number:
H 02 K 49/02	B	7740-5H

Number of Claims: 2 (3 Pages Total)

(54) NAME OF INVENTION: Rotor Rotational Reduction Device

(21) Application Number: S63-223314

(22) Filing Date: September 6, 1988

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DESCRIPTION

1. Name Of The Invention: Rotor Rotational Force Attenuator

2. Claims

(1) A rotor rotational force attenuator comprising a large radius cylinder outer housing and a small radius cylindrical or tubular body supported on the same axis within the outer housing, for

which the interior of said external housing is formed with a ring-shaped magnetic body, and magnets appearing with alternating N and S poles are disposed facing outward from the circumference of said cylindrical or tubular body, and a conductor, disposed between these magnets and said magnetic body, that moves relative to the magnets.

(2) A rotor rotational force attenuator comprising a large radius cylinder outer housing and a small radius cylindrical or tubular body supported on the same axis within the outer housing, for which the exterior of said cylindrical or tubular body is formed with a ring-shaped magnetic body, and magnets appearing with alternating N and S poles are disposed facing inward from the inner circumference of said outer housing, and a conductor, disposed between these magnets and said large diameter cylinder (sic), that moves relative to the magnets.

3. Detailed Description Of The Invention

(Purpose Of The Invention)

(Industrial Field Of Application)

This invention relates to improvement of rotational force attenuators for rotating mechanisms.

(Prior Art)

Among former rotating mechanism rotational force attenuators, there have been various types of so-called brakes, including those that operate braking by methods applying mechanical friction and methods applying viscosity.

With the first-mentioned methods, because they utilize mechanical friction, working life is impacted by abrasion of the braking mechanism, requiring maintenance and replacement of the device; additionally, dust is generated by the friction, and operation can be adversely impacted by contact of dust with rotating parts.

Braking by use of viscosity differs from friction braking in that rotational force is absorbed by

viscosity, but issues arise with enclosure (sealing) of the viscous liquid during manufacturing, and a further disadvantage is lack of stability during mechanism maintenance corresponding to alteration of viscous properties that accompany temperature changes in the locality.

(Problem To Be Solved By This Invention)

As described above, rotational force attenuators of former rotating mechanisms had various difficulties related to composition and long-term use.

This invention fulfills the purpose of eliminating the above-described difficulties with former methods by obtaining attenuation through use of magnetic flux, without employing friction or a viscous fluid.

(Composition Of The Invention)

(Means For Solving The Problem)

The invention of Claim 1 is a rotor rotational force attenuator comprising a large radius cylinder outer housing and a small radius cylindrical or tubular body supported on the same axis within the outer housing, for which the interior of said external housing is formed with a ring-shaped magnetic body, and magnets appearing with alternating N and S poles are disposed facing outward from the circumference of said cylindrical or tubular body, and a conductor, disposed between these magnets and said magnetic body, that moves relative to the magnets.

The invention of Claim 2 is a rotor rotation attenuator comprising a large radius cylinder outer housing and a small radius cylindrical or tubular body supported on the same axis within the outer housing, for which the exterior of said cylindrical or tubular body is formed with a ring-shaped magnetic body, and magnets appearing with alternating N and S poles are disposed facing inward from the inner circumference of said outer housing, and a conductor, disposed between these magnets and said large diameter cylinder (sic), that moves relative to the magnets.

(Operation)

As described above, both the inventions of Claim 1 and Claim 2, regarding the rotating mechanism attenuator comprised by combining of a relatively moving outer housing and rotating cylindrical or tubular body, by rotational movement of magnets disposed on either side between the rotating bodies that move relatively, cause attenuation of rotational force by use of the working of force in which eddy current generated in the conductor impedes rotational operation.

(Embodiment)

The following refers to Figures 1 through 4 in offering detailed explanations of embodiments of the rotor rotational force attenuator of this invention.

Figure 1 is a cross section drawing showing embodiment 1 of this invention, wherein rotating shaft 1 connected to such as a motor is supported for free rotation in relation to outer housing 2 by means of socket 1a.

Ring-shaped magnetic body 3 of material such as iron is fixed on the interior side of outer housing 2, and conductor 4 having flange 4a is fixed in the same way to outer housing 2 in order to cover magnetic body 3.

Cylindrical or tubular body 5 is fixed to rotating shaft 1 so as to move relatively in relation to magnetic body 3 through conductor 4, and as shown in Figure 2, multiple magnets 6 are arranged at the outer side of body 5 with N and S poles appearing alternately.

The following refers to Figure 3 in explaining the rotational force attenuation operation of this invention incorporated into the structure described above. Figure 3 is a cross section drawing showing a cut-away section as seen for the cross section indicated by line A-A of Figure 1. Figure 3 uses symbols identical to those of Figure 1 and omits their explanation.

The lines of magnetic flux from magnets 6 that alternate in pole direction are generated in the direction shown by the arrows, and eddy current is generated in conductor 4 by magnets 6.

Accordingly, as magnets 6 rotate around the center of rotating shaft 1, the generated eddy current works with force in a direction that impedes that rotation, so attenuation force operates in proportion to the rotation speed of magnets 6.

In Figures 1 through 3, magnets 6 are established on the cylindrical body, and these are explained as rotating with rotating shaft 1, but because the same operation can be obtained as long as conductor 4 and magnets 6 rotate relatively, the structure could be configured so that the magnet side is fixed and the outer housing is rotated.

This invention enables exactly identical effect by converting the structure of embodiment 1 so that the elements of the outer housing are used on the rotating side and the elements of the rotating side are used on the outer housing side.

Namely, as shown by cross section drawing Figure 4 for embodiment 2 of the invention, ring-shaped magnetic body 3 is formed on the outer side of rotating cylinder body 5, and magnets 6 are arranged so N and S poles appear alternately while facing inward from the inner side of outer housing 2, and conductor 4 is established on rotating shaft 1 between magnets 6 and the cylinder.

As with Figure 1, the effect is that eddy current is generated in conductor 4 by rotational movement of magnet 6 and the force operates in the direction that impedes rotational movement, by which the rotational force of rotating shaft 1 is attenuated. In addition, in this embodiment, the same effect can be obtained if conductor 4 is made the fixed side and magnets 6 are made the rotating side.

As explained above, the rotor rotational force attenuator of this invention produces a highly reliable device composed of a simple structure, and because it does not utilize mechanical friction or viscosity as with former methods, it does not require consideration of mechanical friction or deterioration of viscosity.

(Effect Of The Invention)

This device of this invention has a simple composition formed by combining magnets on a rotating shaft, a magnetic body that passes magnetic flux, and a conductor that generates eddy current loss, and because it obtains stable rotational attenuating force without using any type of mechanical friction, it has large effect in implementations such as designs for reduction of labor in maintenance control such as maintenance inspections.

4. Brief description of the drawings

Figure 1 is a cross section drawing showing embodiment 1 of the rotor rotational attenuator of this invention. Figure 2 is a perspective drawing showing the rotation body removed from the device shown in Figure 1. Figure 3 is a cross section drawing of the portion of Figure 1 indicated by line A-A. Figure 4 is a cross section drawing showing embodiment 2 of this invention.

1: Rotating Shaft

2: Outer Housing

4: Conductor

5: Cylindrical Or Tubular Body

6: Magnet

Representing Attorney: Fumio Ohgo

1: Rotating Shaft
2: Outer Housing
4: Conductor
5: Cylindrical or Tubular Body
6: Magnet

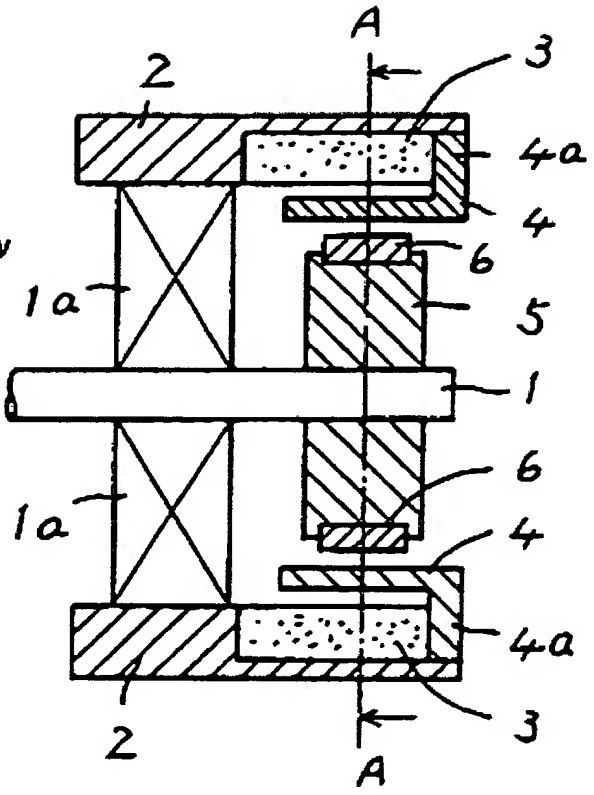

Fig. 1

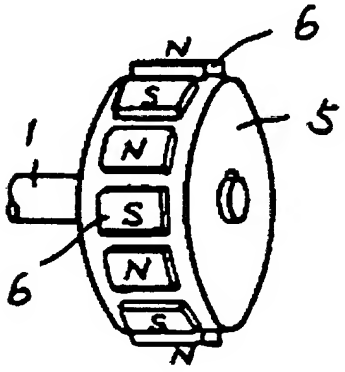

Fig. 2

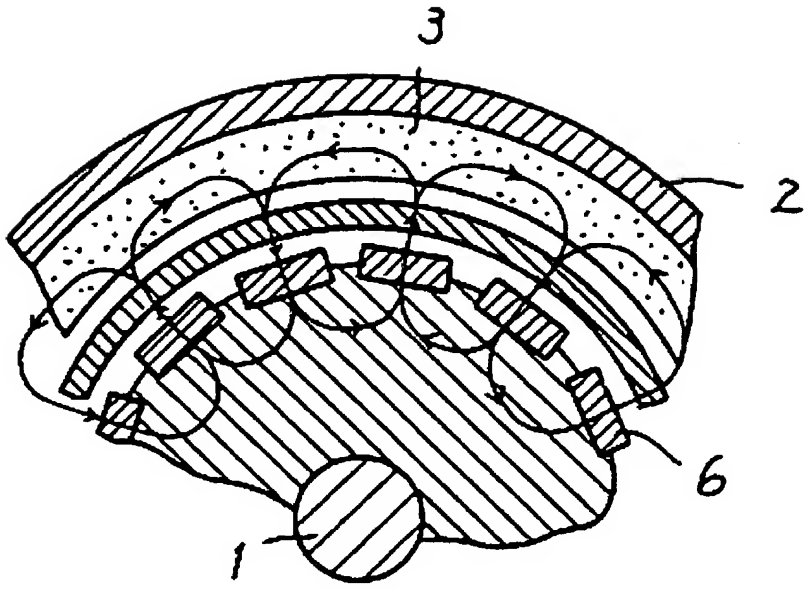

Fig. 3

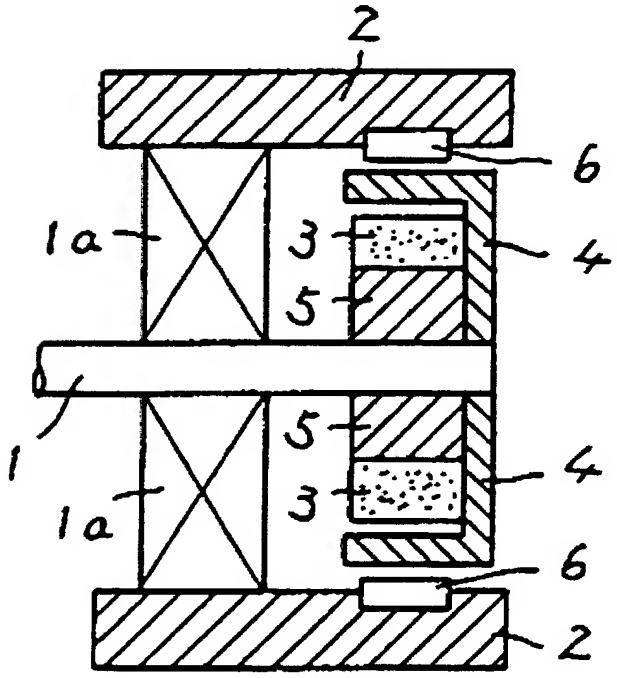

Fig. 4